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EXCESS MORTALITY FROM CAUSES OTHER THAN INFLUENZA AND PNEUMONIA DURING INFLUENZA EPIDEMICS¹

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Studies of mortality during influenza epidemics ordinarily consider the mortality from influenza and pneumonia in *excess* of the usual seasonal expectancy, on the assumption that the epidemic deaths will be credited either to influenza or pneumonia. The use of the influenza and pneumonia categories in studies of this kind has the advantage of eliminating from consideration mortality from any other unrelated epidemic that may have occurred simultaneously with the influenza epidemic.

A study of excess mortality from all causes during the various respiratory epidemics that have occurred during the past 15 years indicates that in every one the *excess* mortality from all causes was appreciably higher than the *excess* mortality credited to influenza and pneumonia. If this situation were true of only one or two of the epidemics, it might be assumed that an unrelated epidemic of some other disease occurred simultaneously with the influenza epidemic; but when every outbreak repeats the phenomenon, it can hardly be concluded that the excess deaths from causes other than influenza and pneumonia are unrelated to the excess deaths from influenza and pneumonia.

For a group of 35 large cities² with an aggregate of nearly 25,000,000 inhabitants, deaths from all causes are available in weekly intervals since October, 1917, and deaths from influenza and pneumonia since September, 1918.³ These data afford the basis for a comparison

¹ From the Office of Statistical Investigations, United States Public Health Service. Part of this article was included in a paper presented before the vital statistics section of the American Public Health Association at its annual meeting in Fort Worth, Tex., in October, 1930.

This study was made as one of a series of studies of influenza under the general direction of the United States Public Health Service Board for the Study of Respiratory Diseases, consisting of Consultant W. H. Frost, Principal Statistician Edgar Sydenstricker, and Senior Statistician Selwyn D. Collins. In the preparation of the study, the author has had the advice and assistance of the other members of this board and of the statistical staff of the Office of Statistical Investigations and associated offices of the Public Health Service.

² For names of these cities see footnote to Table 1. Some further data as to the kind of cities included are contained in a preceding paper on influenza (1).

³ All weekly data included in this paper are from current weekly reports from cities of cases and deaths from influenza and pneumonia and of deaths from all causes as published in the PUBLIC HEALTH REPORTS and in the Weekly Health Index of the United States Census Bureau.

All monthly data included are from the annual volumes of Mortality Statistics published by the United States Census Bureau.

of the excess mortality from all causes with the excess credited to influenza and pneumonia.

Table 1 shows weekly death rates from all causes in this group of cities from 1917 to 1929, and Table 2 shows monthly death rates in the same cities from 1910 to 1919. Similar rates for influenza and pneumonia in the same group of cities may be found in Tables 3 and 4 of a preceding article (1) on influenza which appeared in the PUBLIC HEALTH REPORTS for September 26, 1930. Figure 1 shows these rates graphically for the years 1915 to 1929.

TABLE 1.—Weekly death rates (annual basis) per 100,000 from all causes in a group of 35 cities¹ in the United States, 1917-1929

Week of year	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
1		1,645	2,037	1,444	1,378	1,362	1,508	1,353	1,497	1,557	1,489	1,428	1,896
2		1,732	2,160	1,459	1,371	1,396	1,558	1,466	1,452	1,491	1,412	1,469	2,024
3		1,773	2,308	1,748	1,379	1,439	1,506	1,371	1,456	1,494	1,454	1,375	1,906
4		1,717	2,308	2,400	1,289	1,397	1,544	1,388	1,487	1,460	1,343	1,345	1,815
5		1,690	2,068	2,935	1,414	1,578	1,643	1,447	1,475	1,531	1,433	1,379	1,679
6		1,743	1,913	3,061	1,403	1,594	1,723	1,418	1,470	1,487	1,368	1,398	1,615
7		1,749	1,867	2,561	1,386	1,635	1,813	1,432	1,482	1,670	1,407	1,464	1,543
8		1,597	1,885	2,037	1,452	1,759	1,881	1,454	1,436	1,613	1,434	1,465	1,473
9		1,760	1,908	1,802	1,452	1,727	1,923	1,465	1,487	1,623	1,401	1,481	1,606
10		1,675	1,850	1,654	1,428	1,683	1,769	1,528	1,520	1,793	1,488	1,460	1,495
11		1,769	1,858	1,528	1,389	1,635	1,615	1,416	1,518	1,534	1,459	1,510	1,480
12		1,945	1,787	1,543	1,348	1,516	1,514	1,474	1,494	1,959	1,367	1,509	1,427
13		1,960	1,639	1,424	1,357	1,432	1,491	1,520	1,488	1,730	1,393	1,555	1,345
14		1,958	1,616	1,435	1,375	1,464	1,536	1,509	1,443	1,706	1,436	1,538	1,370
15		1,909	1,570	1,414	1,294	1,416	1,464	1,489	1,470	1,555	1,364	1,493	1,360
16		1,831	1,480	1,436	1,309	1,326	1,422	1,421	1,480	1,621	1,418	1,537	1,320
17		1,728	1,408	1,326	1,252	1,337	1,451	1,447	1,387	1,427	1,375	1,503	1,329
18		1,605	1,424	1,359	1,215	1,367	1,365	1,411	1,358	1,431	1,328	1,538	1,263
19		1,621	1,364	1,333	1,204	1,319	1,289	1,372	1,348	1,344	1,302	1,571	1,294
20		1,455	1,281	1,345	1,220	1,244	1,332	1,322	1,321	1,350	1,280	1,474	1,367
21		1,389	1,332	1,298	1,252	1,228	1,246	1,289	1,267	1,285	1,259	1,419	1,254
22		1,293	1,264	1,224	1,131	1,172	1,247	1,255	1,465	1,251	1,207	1,350	1,281
23		1,336	1,349	1,200	1,084	1,170	1,331	1,260	1,686	1,240	1,189	1,335	1,223
24		1,246	1,165	1,199	1,121	1,174	1,136	1,168	1,164	1,204	1,197	1,246	1,196
25		1,243	1,117	1,065	1,172	1,038	1,216	1,223	1,100	1,161	1,158	1,214	1,219
26		1,279	1,122	1,137	1,115	1,053	1,216	1,183	1,077	1,184	1,169	1,173	1,117
27		1,237	1,107	1,047	1,134	1,090	1,053	1,039	1,200	1,185	1,111	1,178	1,023
28		1,238	1,266	1,026	1,104	1,096	1,112	1,152	1,114	1,100	1,161	1,131	1,142
29		1,304	1,070	1,033	1,042	1,040	1,043	1,115	1,037	1,183	1,091	1,160	1,059
30		1,368	1,082	1,065	1,166	1,036	1,119	1,121	1,058	1,125	1,086	1,106	1,101
31		1,255	1,208	1,095	1,078	1,047	1,047	1,036	1,092	1,089	1,065	1,071	1,094
32		1,473	1,082	1,152	1,081	1,043	1,063	1,062	1,157	1,084	1,063	1,171	1,061
33		1,392	1,082	1,071	1,090	1,093	1,098	1,072	1,103	1,088	1,029	1,102	1,085
34		1,163	1,082	1,067	1,080	1,088	1,090	1,042	1,080	1,063	1,006	1,174	1,064
35		1,162	1,078	1,094	1,111	1,031	1,081	1,108	1,131	1,125	1,073	1,131	1,076
36		1,156	1,068	1,110	1,091	1,066	1,078	1,117	1,108	1,041	1,137	1,042	1,160
37		1,189	1,139	1,101	1,010	1,047	1,030	1,087	1,104	1,115	1,142	1,138	1,025
38		1,315	1,033	1,113	1,054	1,032	1,149	1,082	1,119	1,162	1,066	1,120	1,019
39		1,557	1,077	1,112	1,069	1,063	1,118	1,111	1,111	1,135	1,113	1,144	1,132
40	1,275	2,382	1,089	1,089	1,075	1,142	1,067	1,141	1,129	1,170	1,135	1,254	1,085
41	1,269	4,071	1,079	1,111	1,130	1,087	1,113	1,178	1,219	1,209	1,211	1,152	1,154
42	1,383	6,432	1,114	1,101	1,180	1,152	1,217	1,147	1,235	1,163	1,162	1,264	1,229
43	1,319	6,479	1,110	1,120	1,179	1,195	1,163	1,107	1,276	1,249	1,224	1,27	1,229
44	1,341	4,830	1,142	1,132	1,176	1,231	1,197	1,203	1,289	1,207	1,218	1,189	1,265
45	1,383	3,096	1,103	1,166	1,149	1,243	1,247	1,214	1,282	1,259	1,220	1,250	1,205
46	1,400	2,272	1,172	1,207	1,242	1,241	1,246	1,250	1,266	1,290	1,268	1,288	1,168
47	1,397	1,936	1,197	1,232	1,169	1,249	1,235	1,266	1,210	1,235	1,189	1,312	1,209
48	1,420	1,829	1,248	1,290	1,172	1,262	1,221	1,231	1,328	1,287	1,265	1,286	1,250
49	1,461	2,022	1,313	1,240	1,206	1,315	1,271	1,256	1,297	1,320	1,243	1,412	1,320
50	1,475	2,247	1,294	1,247	1,249	1,358	1,260	1,379	1,342	1,352	1,278	1,561	1,264
51	1,623	2,232	1,350	1,220	1,298	1,430	1,283	1,377	1,231	1,311	1,303	1,650	1,372
52	1,534	2,102	1,292	1,317	1,337	1,422	1,273	1,332	1,463	1,461	1,411	1,784	1,333
53			1,443					1,613					

¹ Boston, Fall River, Worcester, Providence, New Haven, Buffalo, New York, Rochester, Syracuse, Newark, Philadelphia, Baltimore, Washington, Richmond, Atlanta, Cincinnati, Cleveland, Columbus, Toledo, Indianapolis, Chicago, Grand Rapids, Louisville, Memphis, Nashville, Birmingham, Minneapolis, St. Paul, Omaha, Kansas City, Mo., New Orleans, Denver, Los Angeles, San Francisco, Portland, Ore. Aggregate enumerated population in 1920 census, 20,440,548; aggregate estimated 1928 population, 23,421,000. Results of the population enumeration for 1930 indicate that this estimate is less than 3 per cent in error.

Dates of end (Saturday) of first calendar week of the year

Year	First week ended—	Year	First week ended—	Year	First week ended—
1917.....	Jan. 6	1922.....	Jan. 7	1927.....	Jan. 8
1918.....	Jan. 5	1923.....	Jan. 6	1928.....	Jan. 7
1919.....	Jan. 4	1924.....	Jan. 5	1929.....	Jan. 6
1920.....	Jan. 10	1925.....	Jan. 10	1930.....	Jan. 4
1921.....	Jan. 8	1926.....	Jan. 9	1931.....	Jan. 10

TABLE 2.—Monthly death rates (annual basis) per 100,000 from all causes in a group of 35 cities¹ in the United States, 1910–1919

Month	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
January.....	1,750	1,705	1,666	1,648	1,647	1,546	1,849	1,884	1,738	2,196
February.....	1,783	1,717	1,704	1,778	1,730	1,615	1,640	1,836	1,696	1,891
March.....	1,814	1,776	1,700	1,764	1,802	1,714	1,658	1,746	1,852	1,762
April.....	1,709	1,719	1,630	1,612	1,676	1,688	1,559	1,674	1,806	1,498
May.....	1,571	1,590	1,476	1,562	1,536	1,431	1,487	1,573	1,430	1,318
June.....	1,542	1,378	1,333	1,475	1,355	1,317	1,313	1,376	1,260	1,148
July.....	1,693	1,645	1,447	1,462	1,378	1,368	1,467	1,328	1,274	1,154
August.....	1,550	1,424	1,421	1,440	1,383	1,319	1,487	1,429	1,272	1,078
September.....	1,452	1,374	1,364	1,379	1,325	1,324	1,358	1,361	1,425	1,081
October.....	1,431	1,393	1,410	1,353	1,294	1,328	1,326	1,339	5,161	1,121
November.....	1,529	1,468	1,442	1,427	1,401	1,384	1,429	1,413	2,215	1,201
December.....	1,683	1,522	1,604	1,511	1,508	1,736	1,582	1,544	2,112	1,340

¹ Aggregate enumerated population in 1920 census, 20,440,548; aggregate estimated 1928 population 23,421,000. For list of cities, see footnote to Table 1.

In addition to the *actual* death rates which are represented by continuous lines, there are broken lines on the graph (Fig. 1) representing the *normal* or *expected* death rates in the different weeks of the year for the two groups of causes. These expected death rates for the period after July 1, 1919, are based on the median weekly rates for the seven years 1921–1927, and for the period prior to July 1, 1919, are based on the median rates for the seven years 1910–1916.⁴ In the period prior to July 1, 1919, certain corrections for trend in the death rates were necessary in the “all cause” group. These corrections and more detail as to the norms used are given in footnotes to Tables 3 and 5.

The extent of the excess rates in the various epidemics may be judged moderately well from Figure 1 by the extent to which the actual rate (continuous line) exceeds the median or expected rate (broken line) for that season of the year. The epidemics stand out more clearly, however, if the median or expected rate is subtracted from the actual rate for the same week to obtain the amount by which the actual rate was in excess of the expected rate. These deviations are designated in this paper as excess rates. Table 3 shows weekly excess rates from all causes during the period 1917–1929. Similar excess rates for influenza and pneumonia in the same group of cities may be found in Table 5 of the preceding article on influenza (1).

⁴ The years 1918, 1919, 1920, 1928, and 1929 are all marked by more important epidemics than the minor outbreaks of the other years and were not used for the derivation of the norms.

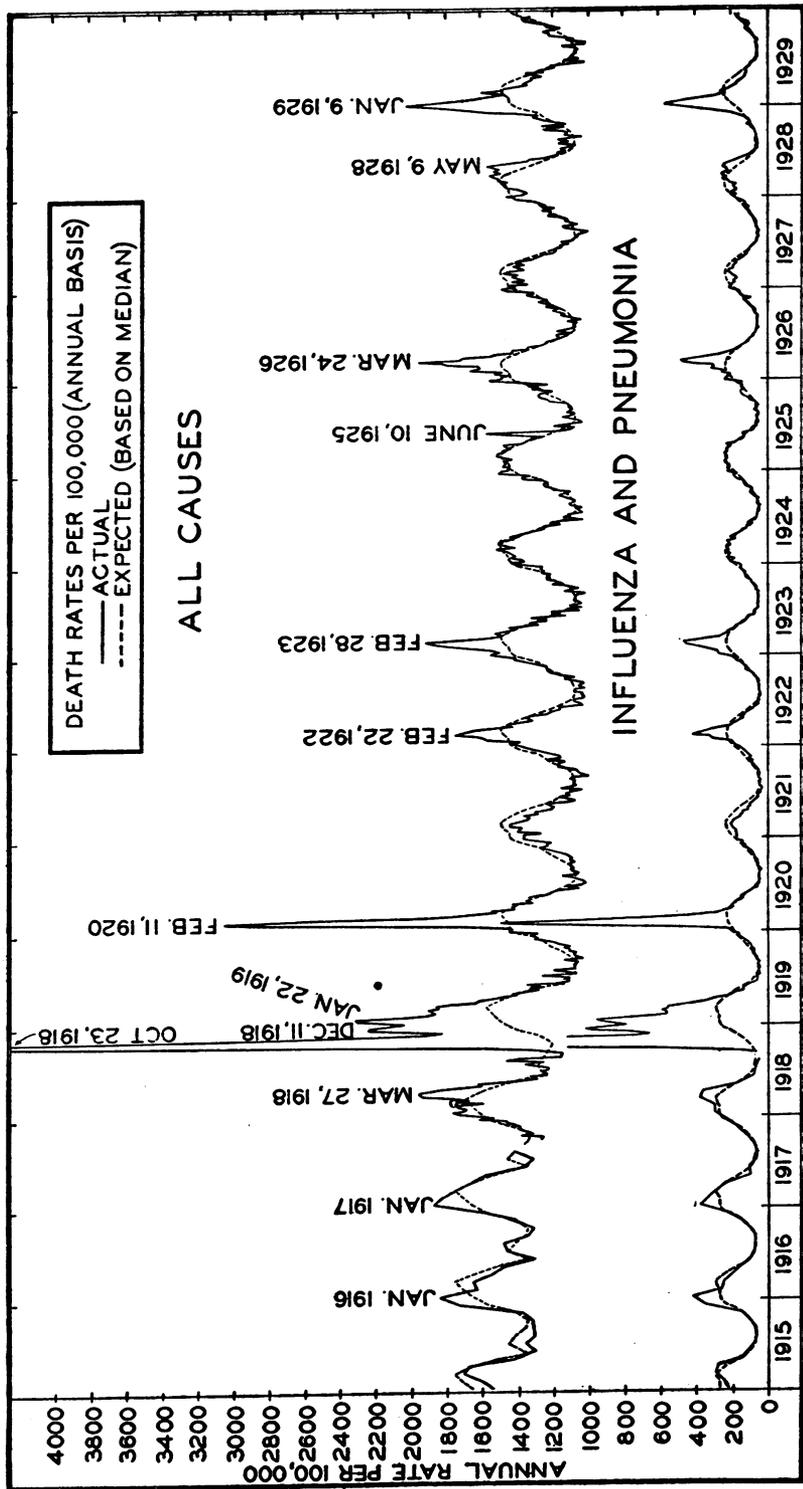


FIGURE 1.—Actual and expected mortality from all causes and from influenza and pneumonia in a group of 35 large cities in the United States, by months, 1915-1917, by weeks, 1918-1929. Dates on graph are middle (Wednesday) of peak weeks. (Expected or normal rates are based on 7-year medians. For details of computations see footnotes to Table 3.)

TABLE 3.—*Excess*¹ *weekly death rates (annual basis) per 100,000 from all causes in a group of 35 large cities*² *in the United States, 1917-1929*

Week of year	Median 1921-1927 (smoothed) ¹	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
1	1,422		+47	+560	+22	-44	-60	+86	-69	+75	+135	+67	+6	+474
2	1,441		+119	-669	+18	-70	-45	+117	+25	+11	+50	-29	+28	+583
3	1,453		+147	-804	+295	-74	-14	+53	-82	+3	+41	+1	+78	+453
4	1,450		+81	-793	+950	-161	-53	+94	-62	+37	+10	-107	-105	+365
5	1,456		+43	-543	+1,479	-42	+122	+187	-9	+19	+75	-23	-77	+232
6	1,456		+88	-380	+1,605	-53	+138	+267	-38	+14	+31	-88	-60	+159
7	1,474		+83	-323	+1,037	-88	+161	+339	-42	+8	+196	-67	-10	+69
8	1,484		-80	-331	+553	-32	+275	+397	-30	-48	+129	-50	-19	-11
9	1,494		+64	-343	+308	-42	+233	+429	-29	-7	+129	-93	-13	+112
10	1,496		-21	-276	+158	-68	+187	+273	+32	+24	+297	-8	-36	-1
11	1,503		+69	-290	+25	-114	+132	+112	-87	+15	+331	-44	+7	-230
12	1,498		+259	-222	+45	-150	+18	+16	-24	-4	+461	-131	+11	-71
13	1,486		+295	+96	-62	-149	-54	+5	+34	+2	+244	-93	+49	-141
14	1,466		+317	+97	-31	-91	-2	+70	+43	-23	+240	-30	+92	-96
15	1,445		+296	+78	-31	-151	-29	+19	+44	+25	+110	-81	+48	-95
16	1,420		+247	+18	+16	-111	-94	+2	+1	+60	+101	-2	+117	-100
17	1,391		+174	-24	-65	-139	-54	+60	+56	-4	+36	-16	+112	-62
18	1,363		+84	+24	-4	-148	+4	+2	+48	-5	+63	-35	+175	-100
19	1,330		+136	+1	+3	-126	-11	-41	+42	+18	+14	-28	+241	-36
20	1,302		+10	-42	+43	-82	-53	+30	+20	+19	+48	-22	+172	+55
21	1,277		-13	+51	+21	-25	-49	-31	+12	-10	+8	-19	+142	-23
22	1,247		-53	+40	-23	-116	-75	0	+8	+218	+4	-40	+103	+34
23	1,215		+43	+178	-15	-131	-45	+116	+45	+371	+25	-26	+120	+8
24	1,197		-18	+22	+2	-76	-23	-61	-29	-33	+7	0	+49	+1
25	1,170		-19	-23	-105	+2	-132	+46	+53	-70	-9	-12	+44	+49
26	1,144		+9	-26	-7	-29	-91	+72	+39	-67	+40	+25	+29	-27
27	1,119		-45	-12	-72	+15	-29	-66	-80	+81	+66	-8	+59	-96
28	1,111		-52	+155	-85	-7	-15	+1	+41	+3	-11	+50	+20	-31
29	1,090		+9	-20	-57	-48	-50	-47	+25	-53	+63	+1	+70	+31
30	1,080		+76	+2	-15	+86	-44	+39	+41	-22	+45	+6	+26	+21
31	1,076		-33	+132	+19	+2	-29	-29	-40	+16	+13	-11	-5	+18
32	1,083		+192	+1	+69	-2	-40	-20	-21	+74	+1	-20	+88	-22
33	1,081		+120	+1	-10	+9	+12	+17	-9	+22	+7	-52	+21	+4
34	1,086		-101	-4	-19	-6	+2	+4	-44	-6	-23	-80	+88	-22
35	1,091		-95	-13	+3	+20	-60	-10	+17	+40	+34	-18	+40	-15
36	1,090		-92	-22	+20	+1	-25	-12	+27	+13	-49	+47	+48	+70
37	1,096		-52	+43	+5	-86	-49	-66	-9	+8	+19	+46	+42	-71
38	1,101		+82	-68	+12	-47	-69	+48	-19	+18	+61	-35	+19	-82
39	1,109		+331	-32	+3	-40	-26	+9	+2	+2	+26	+4	+35	+23
40	1,124	-68	+1,161	-35	-35	-49	+18	-57	+17	+5	+46	+11	+130	-39
41	1,147	-71	+2,852	-68	-36	-17	-60	-34	+31	+72	+62	-26	+5	+7
42	1,166	+40	+5,211	-52	-65	+14	-14	+11	+19	+69	+3	-4	+98	+63
43	1,188	-33	+5,249	-78	-63	-9	+7	-25	-81	+88	+61	+46	-61	+41
44	1,212	-25	+3,585	-70	-80	-36	+19	-15	-9	+77	+5	+6	-23	+53
45	1,226	-3	+1,832	-123	-60	-77	+17	+21	-12	+56	+33	-6	+24	-21
46	1,239	-9	+985	-67	-32	+3	+2	+7	+11	+27	+51	+29	+49	-71
47	1,252	-45	+615	-55	-20	-83	-3	-17	+14	-42	+17	-63	+60	-43
48	1,272	-55	+476	-24	+18	-100	-10	-51	-41	+56	+15	-7	+14	-22
49	1,283	-49	+634	+30	-43	-77	+32	-12	-28	+14	+37	-40	+129	+37
50	1,318	-66	+827	-24	-71	-69	+40	-58	+61	+24	+34	-40	+243	+46
51	1,363	+58	+799	-13	-143	-65	+67	-80	+14	-132	-52	-60	+237	+9
52	1,399	-49	+641	-107	-82	-62	+23	-126	-67	+64	+62	+12	+385	-66
53	1,411		+32					+102						

¹ From July 1, 1919, to Jan. 1, 1930, the excess rates are computed as deviations from the median death rate for the corresponding week for the period 1921-1927. The series of 52 medians representing "normal" or "expected" rates for the different weeks of the year were smoothed by a 5-period moving average before deviations were computed. The smoothed medians are the values in the second column of the table.

For the period prior to July 1, 1919, the excess rates are computed as deviations from a normal based on the estimated median death rate for the corresponding week for the period 1910-1916, but taking account of a trend in the rates from the thirty-sixth week of 1917 to the twenty-sixth week of 1919. As weekly data were not available for the period 1910-1916, monthly rates (annual basis) and medians were computed. The median rates were plotted and a smooth line passing through each of the monthly medians, except July and August, was drawn to represent the seasonal curve of mortality from all causes. From this curve the approximate medians for each week of the year were read. The July and August medians seemed abnormally high, because of a summer peak in the mortality from all causes which was very prominent in the early years of the period 1910-1916, but which was becoming rather unimportant by 1918 and which is almost absent since 1920.

The correction for the trend in the death rates for 1917-1919 was made in the following manner: After deviations from the estimated median rates 1910-1916 were computed it was found that in nonepidemic weeks the deviations tended to fall not along the zero base line (Fig. 2) but along a straight line drawn from zero in the thirty-sixth week of 1917 to a point 220 (in the rate per 100,000) below the zero base line in the twenty-sixth week of 1919, after which the use of the 1910-1916 norm was discontinued. The 220 represents the difference between the 1910-1916 norm used up to July 1, 1919, and the 1921-1927 norm used after that date. Using as a corrected base line the straight line referred to above, the corrected deviations (excess rates) given in the table were computed. The norms for this period prior to July 1, 1919 are not shown in the table but are plotted in Fig. 1.

² Aggregate enumerated population in 1920 census, 20,440,548; aggregate estimated 1928 population, 23,421,000. For list of cities, see footnote to Table 1.

Table 4 shows weekly excess rates from all causes except influenza and pneumonia. These rates were obtained by subtracting the influenza and pneumonia excess rates from the excess rates for all causes for corresponding weeks.

TABLE 4.—Excess¹ weekly death rates (annual basis) per 100,000 from causes other than influenza and pneumonia in a group of 35 cities² in the United States, 1918-1929

Week of year	Year											
	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
1		+36	+18	-35	-34	+33	-42	+50	+89	+46	+4	+146
2		+90	-10	-45	-33	+43	+17	-9	+16	-32	+61	+212
3		+149	+72	-41	+3	-14	-69	-1	+36	+12	-66	+164
4		+105	+204	-121	-42	+23	-29	+32	+16	-69	-60	+114
5		-2	+322	-2	+79	+59	-1	+7	+50	+12	-23	+87
6		+20	+338	+17	+56	+15	-27	+6	+16	-32	-18	+94
7		+42	+261	-58	+63	+122	-22	+4	+117	-8	+31	+34
8		+46	+108	-5	+90	+162	-25	-41	+59	-7	+41	-7
9		+43	+101	-23	+91	+192	-15	0	+63	-61	+8	+88
10		+10	+52	-37	+65	+103	+29	+19	+126	+7	-20	+6
11		+19	-18	-78	+42	+22	-82	+3	+95	-28	-10	-3
12		+22	+29	-94	-19	-23	-5	-2	+206	-02	+9	-29
13		-50	-51	-87	-48	-14	+30	-10	+399	-59	+22	-87
14		+9	-20	-36	+7	+54	+23	-31	+109	-13	+47	-51
15		+10	-31	-91	-12	-5	+64	+14	+33	-55	+17	-42
16		-32	+13	-66	-64	-3	-20	+15	+52	+6	+86	-51
17		-22	-64	-82	-21	+46	+37	-14	+10	-1	+57	-11
18		+28	+9	-98	+11	-11	+34	-9	+46	-11	+88	-60
19		+6	+11	-76	+1	-42	+38	+28	-4	-12	+146	0
20		-10	+28	-50	-57	+30	+10	+17	+31	-4	+80	+76
21		+66	+14	+2	-43	-32	+12	-27	-3	-11	+62	-26
22		+58	-26	-85	-57	-4	-2	+186	+6	-32	+42	+31
23		+192	-12	-105	-34	+104	+35	+360	+19	-28	+72	+9
24		+51	+5	-47	-5	-53	-52	-28	+1	-3	+13	-2
25		+13	-86	+19	-108	+53	+36	-63	-6	-15	+29	+41
26		-12	+2	-7	-82	+61	+26	-59	+32	+19	+15	-22
27		-1	-57	+35	-17	-70	-80	+83	+60	-5	+47	-95
28		+153	-75	+8	-12	+4	+39	+8	-19	+47	+16	+34
29		-9	-50	-31	-43	-45	+22	-48	+89	-4	+64	-32
30		+7	-11	+99	-37	+35	+36	-29	+49	+9	+29	+24
31		+130	+17	+7	-22	-31	-45	+9	+7	-8	-11	+16
32		+3	+71	+3	-37	-25	-17	+61	+1	-27	+75	-23
33		+9	-4	+10	+15	+16	-6	+22	+4	-45	+12	+2
34		+3	-12	+6	+3	+5	-34	-3	-20	-76	+80	-24
35		-10	+19	+18	-54	-9	+14	+21	+35	-22	+37	-12
36		-12	+27	+3	-18	-17	+21	+3	-45	+42	-49	+65
37		-43	+45	+5	-79	-46	-60	-8	-1	+27	+43	-65
38		+19	-65	+16	-42	-58	+38	-14	+29	+53	-37	-12
39		+17	-27	+5	-32	-18	+8	-7	+4	+17	+7	+29
40		+116	-30	-23	-37	+22	-56	+7	+4	+52	+13	+110
41		+193	-73	-26	-2	-59	-28	+13	+52	+59	-22	-2
42		+412	-40	-53	+24	-8	+47	-28	+54	-9	-3	+65
43		+457	-53	-50	0	+8	-19	-71	+63	+52	+46	-58
44		+209	-50	-56	-26	+21	-8	+5	+39	+9	+16	-14
45		+113	-99	-39	-56	+2	+13	-23	+22	+29	-2	+94
46		+84	-36	-13	+11	+1	+6	+1	-3	+43	+31	+54
47		+47	-22	-13	-54	-8	-21	+16	-42	+25	-85	+54
48		+12	-3	+19	-75	-19	-42	-45	+40	+10	+2	-12
49		+80	+37	-32	-53	+19	-6	-56	+17	+28	-21	+66
50		+90	-23	-67	-44	+16	-55	+31	+24	+37	-19	+122
51		+19	-12	-120	-37	+44	-66	-14	-111	-44	+44	+100
52		+3	-91	-83	-31	0	-93	-55	+51	+60	+13	+131
53			+27				+63					-43

¹ Excess rates were computed by subtracting (algebraically) from the excess rates for all causes as given in Table 3, the excess rates from influenza and pneumonia as given in Table 5 of the preceding article on influenza and pneumonia in the Public Health Reports for Sept. 26, 1930 (1).

² Aggregate enumerated population in 1920 census, 20,440,548; aggregate estimated 1928 population, 23,421,000. For list of cities, see footnote to Table 1.

Figures 2 and 3 show graphically excess rates from all causes, from influenza and pneumonia, and from all other causes, from 1915 to 1929. It may be seen in these graphs that for every period in which there is a definite peak of excess mortality from influenza and pneumonia there is a corresponding peak of excess mortality credited to causes other than influenza and pneumonia. In some of the minor epidemics the excess mortality credited to causes other than influenza and pneumonia is of the same order of magnitude as the excess credited to influenza and pneumonia; in fact, during the minor epidemic of the spring of 1928, the excess credited to causes other than influenza and pneumonia reached a higher rate than that credited to influenza and pneumonia.

The rather large excess in the week with a midpoint (Wednesday) on June 10, 1925, coincides with or immediately follows an unusually hot week during which a considerable number of heat prostrations and deaths from overheating were reported, particularly in New York City, which is included in this group of 35 cities. Presumably the peak in "all causes," which has no counterpart in the influenza and pneumonia rates, is due to these deaths.

Figure 4, which shows the excess mortality during each of the epidemics, is drawn on a scale to facilitate comparison of the rise and fall of the curves for the different cause groups. The horizontal, or time, scale is made very much larger than in the preceding graphs, and the excess rates are shown only for the few weeks during which the death rate was definitely above normal. The vertical, or rate, scales are arranged in such a way that the height of the peaks for all causes in the different epidemics will be about the same. In this figure it may be seen that for the various epidemics the peak of the excess mortality from causes other than influenza and pneumonia comes in the same week as the peak of the excess mortality from influenza and pneumonia, and that the rise and fall of the rates for the two groups of causes is similar.

Table 5 shows several constants which indicate the time distribution of the excess deaths. The modal, or peak, day has been estimated within the peak week by taking account of the rates in the preceding week and in the following week. Computations have also been made to indicate the day on which one-fourth, one-half, and three-fourths of the excess deaths had occurred and the number of days between these dates. An examination of the table confirms the impression obtained from Figure 4 that, with respect to time distribution, the excess deaths credited to causes other than influenza and pneumonia exhibit the same concentration within a few weeks as the excess deaths credited to influenza and pneumonia.

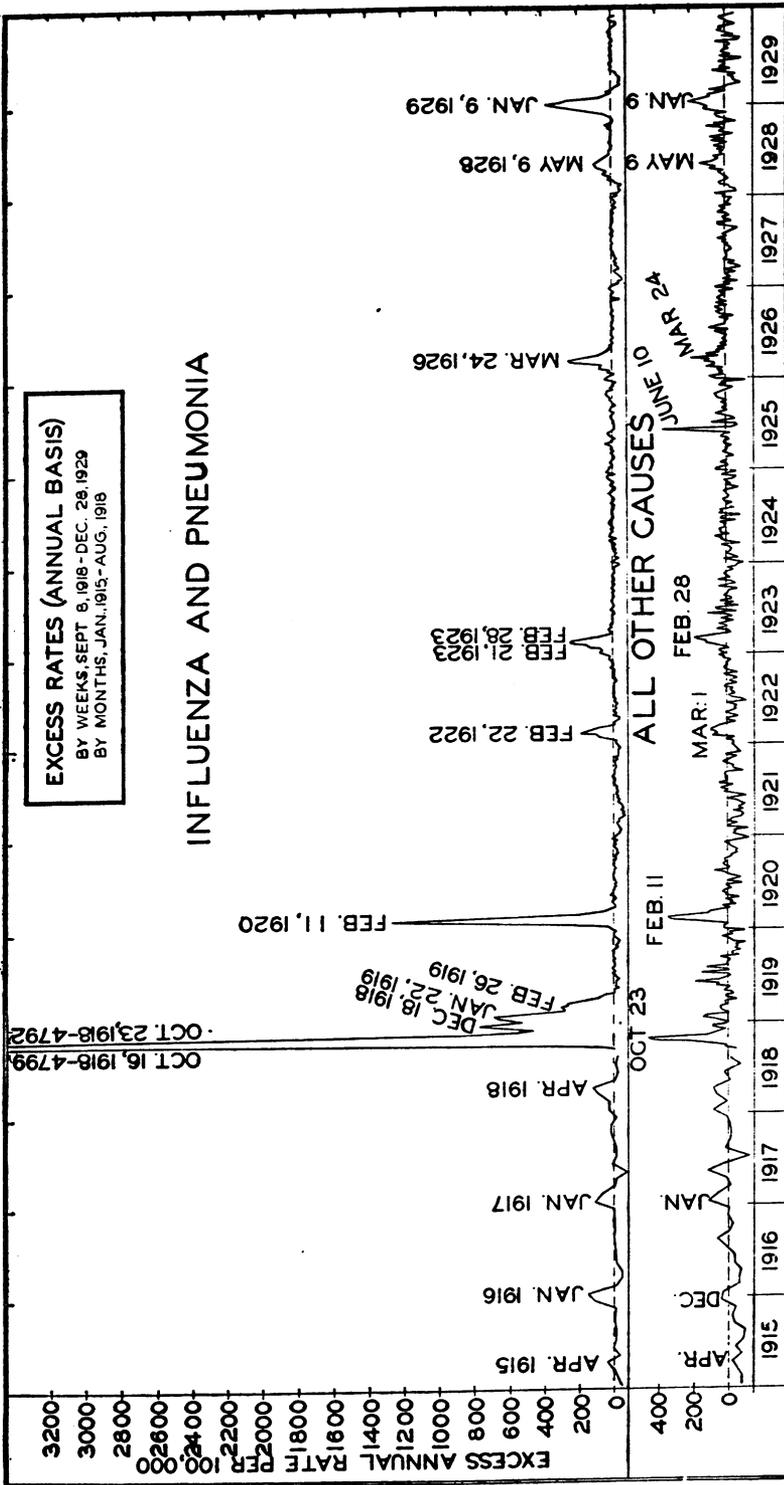


FIGURE 3.—Excess mortality from influenza and pneumonia and from all other causes in a group of 35 large cities in the United States, by months, 1915-1917, by weeks, 1918-1929. Dates on graph are middle (Wednesday) of peak weeks. (Excess over expected or normal rates for corresponding weeks based on 7-year medians. For details of computations see footnotes to Tables 3 and 4.)

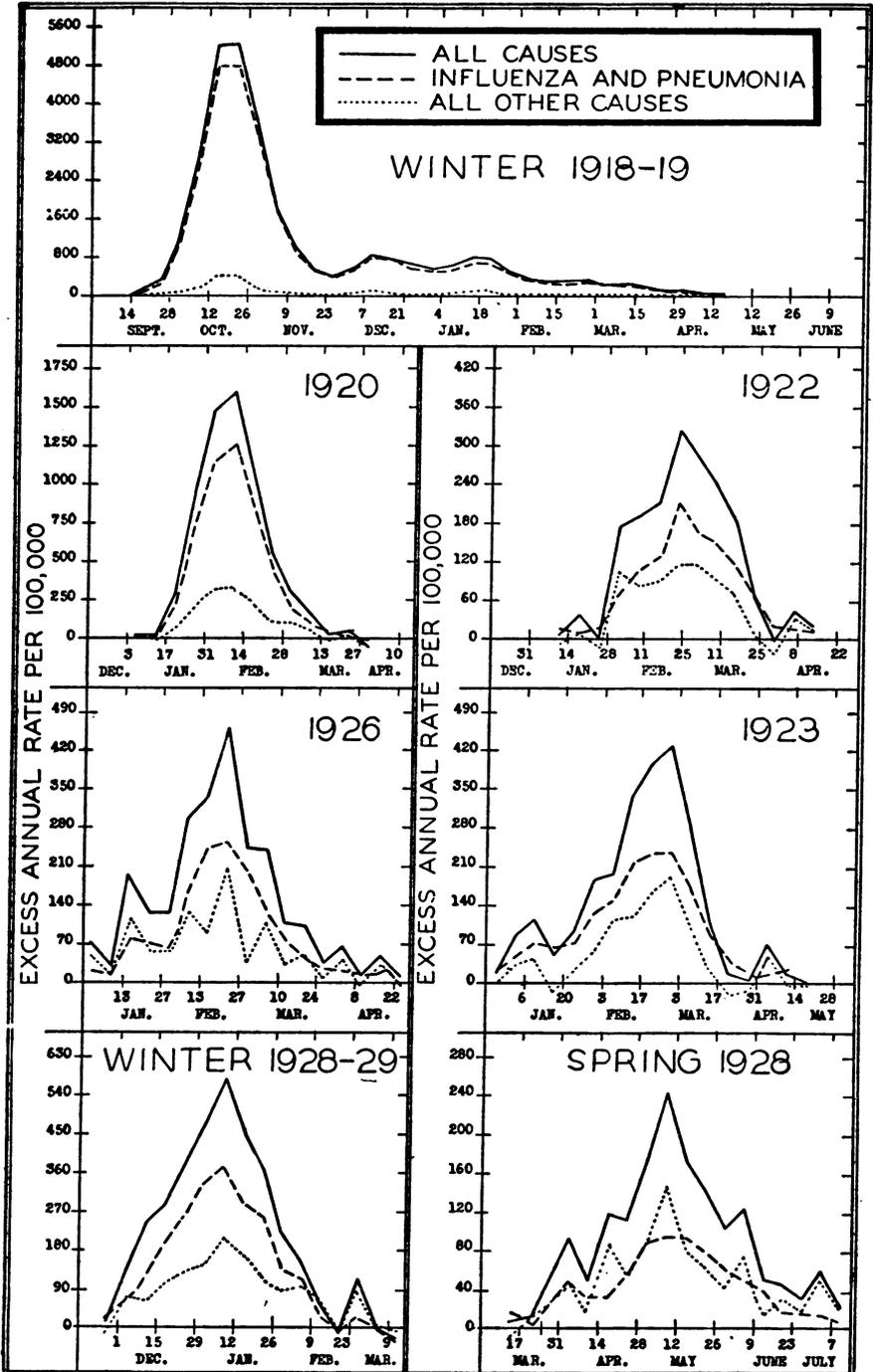


FIGURE 4.—Weekly excess mortality rates (annual basis) from all causes, from influenza and pneumonia, and from all other causes during 7 epidemics in a group of 35 large cities in the United States, 1918-1929. (Excess over expected or normal rates for corresponding weeks based on 7-year medians. For details of computations see footnotes to Tables 3 and 4.)

TABLE 5.—Summary of extent and time distribution of the excess¹ mortality during each respiratory epidemic in a group of 35 cities² in the United States, 1915-1929

Epidemic	Total excess ¹ during whole epidemic		Maximum weekly excess rate per 100,000		Date of middle (Wednes. day) of peak week	Estimated modal or peak day ³	Day on which the specified proportion of the excess deaths had occurred			Inter-quartile range (number of days between first and third quartiles)	Number of days between median and third quartile	Total period considered as above normal	
	Rate per 100,000	Per cent credited to each cause group	Actual or weekly basis	Annual basis			One-fourth (first quartile) ⁴	One-half (median) ⁴	Three-fourths (third quartile) ⁴			Total number of weeks	Dates of weeks included
Spring of 1915:													
All causes	11.8	100			Apr., 1915	Apr., 1915							
Influenza and pneumonia	7.3	62			Apr., 1915	Apr., 1915							
All other causes	4.5	38			Apr., 1915	Apr., 1915							
Winter of 1915-16:													
All causes	35.4	100			Jan., 1916	Jan., 1916							
Influenza and pneumonia	22.8	64			Jan., 1916	Jan., 1916							
All other causes	12.6	36			Dec., 1915	Dec., 1915							
1917:													
All causes	27.6	100			Jan., 1917	Jan., 1917							
Influenza and pneumonia	14.0	51			Jan., 1917	Jan., 1917							
All other causes	13.6	49			Jan., 1917	Jan., 1917							
Spring of 1918:													
All causes	42.1	100			Apr., 1918	Apr., 1918							
Influenza and pneumonia	21.1	50			Apr., 1918	Apr., 1918							
All other causes	21.0	50			Apr., 1918	Apr., 1918							
Winter of 1918-19:													
All causes	598.0	100	100.67	5,249	Oct. 23	Oct. 20	Oct. 17	Oct. 28	64	11	43		
Influenza and pneumonia	550.5	92	92.04	4,799	Oct. 16	Oct. 19	Oct. 17	Oct. 28	64	11	43		
All other causes	47.5	8	8.63	450	Oct. 23	Oct. 21	Oct. 18	Oct. 29	67	11	46		
1920:													
All causes	125.5	100	30.78	1,605	Feb. 11	Feb. 8	Feb. 2	Feb. 10	16	8	8		
Influenza and pneumonia	97.2	77	24.30	1,267	Feb. 11	Feb. 9	Feb. 2	Feb. 10	16	8	8		
All other causes	28.3	23	6.48	338	Feb. 11	Feb. 9	Feb. 2	Feb. 10	17	8	9		

See footnotes at end of table.

TABLE 5.—Summary of extent and time distribution of the excess¹ mortality during each respiratory epidemic in a group of 35 cities² in the United States, 1915-1923—Continued

Epidemic	Total excess ¹ during whole epidemic		Maximum weekly excess rate per 100,000		Date of middle (Wednesday) of peak week	Estimated modal or peak day ²	Day on which the specified proportion of the excess deaths had occurred			Inter-quartile range (number of days between first and third quartiles)	Number of days between first and third quartile	Total period considered as above normal
	Rate per 100,000	Per cent credited to each cause group	Actual or weekly basis	Annual basis			One-fourth (first quartile) ³	One-half (median) ⁴	Three-fourths (third quartile) ⁵			
1922:												
All causes.....	34.1	100	6.23	325	Feb. 22....	Feb. 24....	Feb. 13....	Feb. 24....	Mar. 8....	23	11	{ Jan. 8-Apr. 15, 1922 (second to fifteenth week, inclusive).
Influenza and pneumonia.....	20.7	61	4.03	210	Feb. 22....	Feb. 23....	Feb. 15....	Feb. 25....	Mar. 9....	22	10	
All other causes.....	13.4	39	2.20	115	Mar. 1....	Feb. 26....	Feb. 9....	Feb. 23....	Mar. 6....	25	14	
1923:												
All causes.....	50.4	100	8.23	429	Feb. 28....	Feb. 26....	Feb. 2....	Feb. 18....	Mar. 1....	27	16	{ Nov. 26, 1922-Apr. 14, 1923 (forty-eight to fifteenth week, inclusive).
Influenza and pneumonia.....	32.3	64	4.55	237	Feb. 28....	Feb. 25....	Jan. 31....	Feb. 17....	Mar. 2....	30	17	
All other causes.....	18.1	36	3.68	192	Feb. 28....	Feb. 28....	Feb. 4....	Feb. 19....	Mar. 1....	25	15	
1926:												
All causes.....	48.3	100	8.84	461	Mar. 24....	Mar. 23....	Mar. 8....	Mar. 23....	Apr. 3....	26	14	{ Jan. 31-May 29, 1926 (fifth to twenty-first week, inclusive).
Influenza and pneumonia.....	28.2	58	4.80	255	Mar. 24....	Mar. 22....	Mar. 11....	Mar. 22....	Apr. 3....	23	12	
All other causes.....	20.1	42	3.95	206	Mar. 24....	Mar. 23....	Mar. 2....	Mar. 20....	Apr. 5....	34	18	
Spring of 1928:												
All causes.....	31.8	100	4.62	241	May 9....	May 9....	Apr. 27....	May 12....	June 1....	35	18	{ Mar. 11-July 31, 1928 (eleventh to twenty-ninth week, inclusive).
Influenza and pneumonia.....	14.5	45	1.82	90	May 9....	May 11....	Apr. 26....	May 12....	May 27....	31	16	
All other causes.....	17.3	55	2.80	146	May 9....	May 9....	Apr. 27....	May 12....	June 5....	39	18	
Winter of 1928-29:												
All causes.....	64.9	100	11.18	583	Jan. 9....	Jan. 9....	Dec. 26....	Jan. 7....	Jan. 19....	24	12	{ Nov. 25, 1928-Feb. 16, 1929 (forty-eighth to seventh week, inclusive).
Influenza and pneumonia.....	40.8	63	7.11	371	Jan. 9....	Jan. 8....	Dec. 26....	Jan. 7....	Jan. 18....	23	12	
All other causes.....	24.1	37	4.07	212	Jan. 9....	Jan. 10....	Dec. 24....	Jan. 8....	Jan. 20....	27	15	

¹ Excess rates are computed from data plotted in Figs. 2 and 3 and given in the accompanying tables. From July 1, 1919, to Jan. 1, 1930, the excess rates are computed as deviations from median rates for corresponding times of the year during the period 1921-1927; prior to July 1, 1919, the excess rates are computed as deviations from similar median rates during the period 1910-1916; corrections were made in the case of certain epidemics because the rates both before and after the outbreak were lower than the median rates used as normal. The corrections in such instances were made by measuring the excess not over the zero base line representing the median rate (Figs. 2 and 3), but over a line drawn below the base line. In all instances except the correction for all causes in 1918-19, the new line from which deviations were measured was parallel to the base line—in other words, the correction for the different weeks of the epidemic was constant. The corrections in terms of annual rates per 100,000 were as follows:

Epidemic of 1922—all causes, 50; influenza and pneumonia, 25; all other causes, 25.

Epidemic of the winter of 1915-16—all causes, 40; influenza and pneumonia, 25; all other causes, 40.

Epidemic of the spring of 1915—all causes, 90; influenza and pneumonia, 25; all other causes, 65.

For the epidemics of the spring of 1918 and the winter of 1918-19, no correction was needed for influenza and pneumonia, 25; for further details as to the computation of the norms and excess rates, see footnote to Table 3.

² Aggregate enumerated population in 1920 census, 20,440,548; aggregate estimated 1928 population, 23,421,000. For list of cities, see footnote to Table 1.

³ The modal day of peak day was estimated by interpolation within the modal or peak week (determined by inspection) of the excess death rates by the method of differences, the following formula being used:

$$\text{Mode} = L + \left[\frac{-\Delta_1 f_{-1}}{\Delta_1 f_{-1}} \right] \text{ in which}$$

L = lower limit of modal class (first day of peak week).

f_0 = frequency (excess rate) in modal or peak week.

f_{-1} = frequency (excess rate) in week prior to modal or peak week.

f_{+1} = frequency (excess rate) in week following modal or peak week.

First and second differences (Δ and Δ^2 , respectively) for use in the formula are computed as follows:

$$\Delta f_{-1} = f_0 - f_{-1}$$

$$\Delta f_{+1} = f_0 - f_{+1}$$

The expression in the formula which is added to the lower limit of the modal class always comes out in the form of a fraction or decimal less than unity and is in usual frequency distributions multiplied by the class interval and added to the lower limit of the class. This was adapted to the weekly intervals by reducing this decimal to sevenths; if it was less than one-seventh, the estimated modal day was the first day of the week; if it was between one-seventh and two-sevenths, the modal day was the second day of the week, etc. The median and quartile days were determined in the manner in which those constants are determined for a frequency distribution (the excess rates for this purpose being considered as frequencies), the interpolation within the median or quartile week to estimate the median or quartile day being done, as is usual in computing these constants, on a straight-line basis.

If the excess rates in the various weeks of the epidemic are summed and reduced from an annual to an actual basis, there is

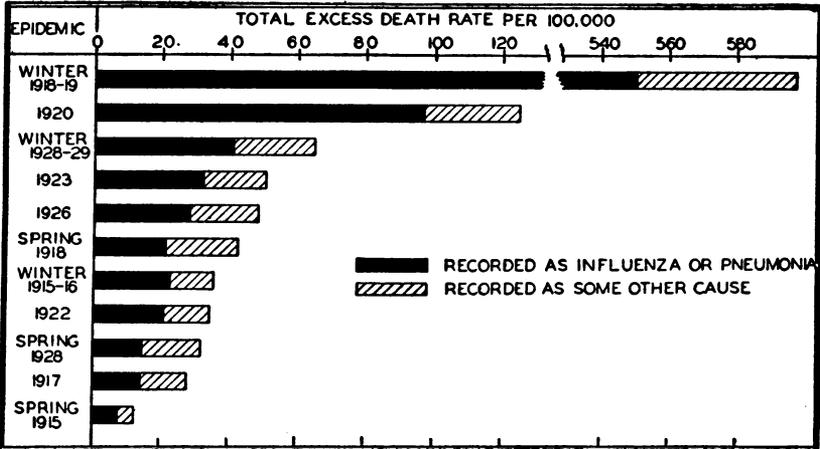


FIGURE 5.—Total excess mortality from all causes, from influenza and pneumonia, and from all other causes during 11 epidemics in a group of 35 large cities in the United States, 1915-1929. (Excess over expected or normal rates for corresponding weeks based on 7-year medians. For details of computations see footnotes to Table 5.)

obtained a figure representing the total excess rate throughout the whole epidemic. Figure 5 shows these total excess rates for each of the 11 epidemics from 1915 to 1929. In this graph the total bar repre-

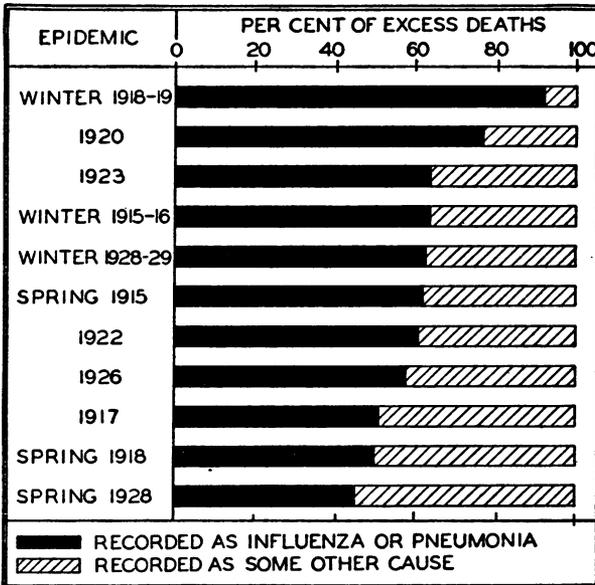


FIGURE 6.—Percentage of excess deaths from all causes that were recorded as influenza or pneumonia and that were recorded as some other cause during 11 epidemics in a group of 35 large cities in the United States, 1915-1929

sents the total excess from all causes, but each bar is divided into a black portion which represents the excess mortality credited to influ-

enza and pneumonia and a cross-hatched portion which represents the excess mortality from causes other than influenza and pneumonia. This graph indicates more clearly what has already been suggested in the weekly graph, that the excess mortality credited to causes other than influenza and pneumonia forms an appreciable part of the total.

It might be worth while to consider the percentage of the total excess mortality that was credited to influenza and pneumonia as compared with the percentage credited to other causes. (Fig. 6.) Only 8 per cent of the excess mortality during the pandemic of 1918-19 was credited to causes other than influenza and pneumonia, but in every one of the other epidemics the percentage credited to causes other than influenza and pneumonia is considerable; in fact, for the epidemics other than 1918-19 and 1920, about 40 per cent of the excess deaths have been credited to causes other than influenza and pneumonia. In the small epidemic of the spring of 1928, more than half of the excess deaths were credited to causes other than influenza and pneumonia, and in the epidemic of the spring of 1918 about half of the excess deaths were so credited.⁵

Part or all of the excess mortality from causes other than influenza and pneumonia may be accounted for by deaths in which influenza or pneumonia was credited as being a contributory cause but not the primary cause of death. In 10 cities⁶ in which influenza surveys

⁵ Computations based on final monthly mortality figures published by the U. S. Bureau of the Census indicate that an even greater proportion of the total excess deaths are generally credited to causes other than influenza and pneumonia than these preliminary weekly data show. The following table makes a comparison for each epidemic of results based on the two sources for the group of 35 cities considered in this study:

Source of data	Epidemic of—									
	Winter, 1918-19	1920	1922	1923	1926	Spring, 1928	Winter, 1928-29	Summary, 1918-1920	Summary, 1922-1929	
	Per cent that excess mortality credited to causes other than influenza and pneumonia is of the total excess mortality from all causes									
Based on final monthly data from Census Bureau.....	11.9	26.8	43.2	45.7	50.4	46.2	45.7	14.8	46.3	
Based on preliminary weekly reports from cities.....	7.9	22.5	39.3	35.9	41.6	54.4	37.1	10.5	40.5	
	Per cent that excess mortality credited to causes other than influenza and pneumonia is of the excess mortality credited to influenza and pneumonia									
Based on final monthly data from Census Bureau.....	13.6	36.7	76.0	84.1	101.8	85.9	84.2	17.3	86.3	
Based on preliminary reports from cities.....	8.6	29.1	64.7	56.0	71.2	119.3	59.1	11.7	68.1	

So far as excess mortality from all causes is concerned, the preliminary weekly reports from the cities and the final monthly figures from the U. S. Bureau of the Census indicate approximately the same total excess mortality.

⁶ San Francisco, Seattle, Des Moines, Kansas City, Mo., New Orleans, Cincinnati, Pittsburgh, Baltimore, Syracuse, Boston.

were made by the United States Public Health Service (2) following the epidemic of the winter of 1928-29 there was copied from the files of the local registrars of vital statistics a record of all deaths in which a respiratory cause was the primary or a contributory cause of death for the period from January 1, 1928, to the end of the epidemic in 1929. During the first five calendar weeks of 1929 (approximately the month of January) there occurred in these 10 cities 2,599 deaths in which influenza or pneumonia was the primary⁷ cause, as against 952 during the first five weeks of 1928, an *excess* of 1,647 deaths credited to influenza or pneumonia. During the same 5-week period of 1929 there were 730 deaths in which influenza or pneumonia was credited as being a contributory cause but not the primary cause of death, as against 286 during the first five weeks of 1928, an *excess* of 444 deaths. The 444 excess deaths in which influenza or pneumonia was contributory are equal to 27 per cent of the 1,647 excess deaths credited as being due primarily to influenza or pneumonia.

The official mortality reports of the United States Bureau of the Census include data on nearly all phases of mortality in the same 10 cities except contributory causes of death. Considering data from that source on primary causes of death, 2,406 deaths from influenza and pneumonia occurred in these 10 cities during the calendar month of January, 1929, as against 884 during January, 1928, an *excess* of 1,522 deaths. Deaths from causes other than influenza and pneumonia amounted to 6,370 in January, 1929, as against 5,401 in January, 1928, an *excess* of 969 deaths. The 969 excess deaths credited to causes other than influenza and pneumonia are equal to 64 per cent of the 1,522 excess deaths credited to influenza and pneumonia. In contrast, it will be remembered that the excess deaths in which influenza or pneumonia was a contributory cause were equal to only 27 per cent of those in which influenza or pneumonia was primary. In other words, less than half of the excess deaths credited primarily to causes other than influenza and pneumonia are accounted for by those in which influenza or pneumonia is listed as a contributory cause of death.⁸

Excess mortality credited to causes other than influenza and pneumonia that has the same time distribution as that credited to influenza and pneumonia must in some way be related to the epidemic.

⁷ In determining which of the joint causes was primary and which contributory, the rules set forth in the Manual of Joint Causes prepared by the Mortality Division, U. S. Bureau of the Census were rigidly followed in order to make these data comparable with official mortality statistics.

⁸ Similar computations based on two and three month periods instead of January alone give approximately the same result.

The use of the data for January, 1928, as a normal from which to measure the excess seems justifiable, because in the data for the 35 cities (1) the rate for January, 1928, approximates the January median for the period 1921-1927. In this group of 35 cities the excess mortality from causes other than influenza and pneumonia during the whole epidemic of 1928-29 amounted to 59 per cent of the excess credited to influenza and pneumonia, as against 57 per cent during the whole epidemic and 64 per cent during the month of January in similar computations for the 10 cities. The data for the 10 cities have been used because they were the only data available on influenza and pneumonia as contributory causes of death.

One possible explanation would be that persons with certain chronic diseases are easy victims of influenza and pneumonia and many die during the epidemics. In such cases some doctors might record the death as due to the condition that had existed longer and was primary in point of time while others might record it as due to the acute condition which was the reason for the death occurring at the particular time. Such deaths are obviously the joint result of both conditions and the necessity of choosing one cause as primary leads to difficulties that are not easily disposed of. The following analysis is not intended as a criticism of the usual method of determining primary causes of death, but only as an attempt to indicate what primary causes of death should be considered in an effort to trace down all of the deaths associated with influenza epidemics in the United States.

In connection with this problem deaths from certain chronic diseases in the group of 35 cities were assembled in monthly intervals for a series of years as far back as the data for each cause were available. Rates for monthly time intervals were plotted. The elimination of trend and seasonal variation would have made the peaks clearer, but graphs of the actual rates indicated fairly well the months in which the rates were abnormally high. Space does not permit the reproduction of these graphs, but the outstanding points may be summarized.

In the case of organic heart diseases there was a peak, corresponding in time with the influenza peak, for practically every epidemic. The heights of the peaks were relatively small, but they were sufficiently above other rates to be definitely more than would be expected at that season of the year. Nephritis and diabetes both had some peaks corresponding in time to the influenza peaks, but they were smaller and less definite than in the case of organic heart diseases. Cerebral hemorrhage showed peaks during some of the epidemics. The excessive rates for respiratory tuberculosis during influenza epidemics was pointed out some years ago by Britten and Sydenstricker (3). Non-respiratory tuberculosis showed no marked peaks at times when influenza was prevalent. Puerperal septicemia rates had no peaks that occurred at times when influenza was epidemic. Other puerperal conditions, however, showed very large peaks coinciding in time with the 1918 and 1920 influenza peaks. Bronchitis showed very definite peaks with each epidemic. Cancer showed no peaks of any importance during influenza epidemics.

An attempt was made to estimate roughly the excess death rates credited to the various causes other than influenza and pneumonia. Excess rates were computed as deviations from rates for corresponding months of a preceding or following year or the average of a preceding and a following year, due account being taken of rates for corresponding months of other years to check the suitability of the norm selected.

Because of the rough character of the methods used, the data are not shown for each epidemic separately but only for two groups of epidemics—(a) winter 1918–19, and 1920, and (b) 1922, 1923, 1926, spring 1928, and winter 1928–29. It will be noted in the tables which follow that the results for these two groups differ rather markedly; the individual epidemics within the respective groups were much more similar.

Table 6 shows the per cent of excess mortality from causes other than influenza and pneumonia that was credited to certain specific causes.

TABLE 6.—Per cent that the excess¹ mortality from certain causes is of the excess mortality from all causes except influenza and pneumonia, during months when influenza is epidemic—35 large cities in the United States²

Cause of death (with International List number, 1920 revision)	Per cent that the excess mortality from each cause is of excess mortality from all causes except influenza and pneumonia		Total excess mortality per 100,000 population (actual basis)	
	Epidemics of winter 1918–19 and 1920 ³	Epidemics of 1922, 1923, 1926, spring 1928 and winter 1928–29 ³	Epidemics of winter 1918–19 and 1920 ³	Epidemics of 1922, 1923, 1926, spring 1928 and winter 1928–29 ³
All causes except influenza and pneumonia.....	100.0	100.0	498.9	4104.2
Organic heart diseases (90).....	18.4	46.4	18.2	48.4
Nephritis (128, 129).....	11.4	16.0	11.3	16.7
Cerebral hemorrhage and softening (74, 83).....	3.9	9.3	3.9	9.7
Diabetes mellitus (67).....	(⁴)	6.3	(⁴)	6.5
Respiratory tuberculosis (31).....	19.1	6.9	18.9	7.2
Bronchitis (99).....	5.4	4.3	5.3	4.5
Puerperal causes other than septicemia (143–145; 147–150).....	8.0	.9	7.9	.9

¹ Excess over the corresponding month of the preceding year or the average of a preceding year and a following year.

² For list of cities see footnote to Table 1.

³ Months included as epidemic in this table were as follows: September, 1918–January, 1919; January–March, 1920; January–March, 1922; December, 1922–March, 1923; February–April, 1926; March–June, 1928; December, 1928–February, 1929.

⁴ The total excess rates from all causes except influenza and pneumonia in this table can not be expected to agree with those given in Table 5 for several reasons: (a) Data in Table 5 are based on preliminary weekly reports from the cities and data in this table are based on final figures from the Census Bureau; (b) total rates in Table 5 are computed from weekly rates and total rates in this table are computed from monthly rates for only approximately the same period of time; (c) in the final tabulation of the Census Bureau, the allocation to the different cause groups and the method of determining the primary cause in joint cause deaths may have been slightly different from that used by the cities.

⁵ No monthly data available prior to 1921.

During the major influenza epidemics of 1918–19 and 1920, 19 per cent of the excess deaths from causes other than influenza and pneumonia were credited to respiratory tuberculosis, 18 per cent to organic heart diseases, 11 per cent to nephritis, 8 per cent to puerperal conditions other than septicemia, 5 per cent to bronchitis, and 4 per cent to cerebral hemorrhage. In the epidemics of 1922, 1923, and 1926, spring of 1928, and the winter of 1928–29 organic heart diseases were more important and tuberculosis and puerperal causes less important as contributors to the excess deaths from causes other than influenza and pneumonia. In those epidemics 46 per cent of such excess deaths were credited to organic heart diseases, 16 per cent to nephritis, 9 per cent to cerebral hemorrhage, 7 per cent to respiratory tuberculosis,

6 per cent to diabetes, 4 per cent to bronchitis, and 1 per cent to puerperal causes other than septicemia.

The chief differences between the two groups of epidemics, it will be noted, are (a) respiratory tuberculosis and puerperal causes were both less important as causes of excess deaths in the epidemics of 1922-1929 than in those of 1918-1920 (the fact that the 1918-19 and 1920 epidemics fell heavily upon young adults may in part explain the high excess rates for these conditions, which likewise fall heavily upon young adults); and (b) organic heart diseases and to a lesser extent nephritis and cerebral hemorrhage were more important as causes of excess deaths in the 1922-1929 epidemics than in the larger epidemics of 1918-1920. In these minor epidemics organic heart diseases account for somewhere near half of the excess deaths not credited to influenza and pneumonia. With respect to this situation, all the epidemics included in the 1922-1929 group are similar, there being no definite tendency toward increase or decrease in the percentage credited to organic heart diseases since 1922.

Some of the causes of death considered in Table 6 are not of first importance in absolute numbers, and therefore the excess credited to them does not greatly enhance the excess mortality of the epidemic. It is important, however, in studying chronological changes in the death rate from such conditions as those included in Table 6 to remember that during periods when influenza is epidemic the death rate from these diseases is considerably increased. Table 7 shows the per cent that the excess death rate from certain specific causes is of the expected or normal rate for the same cause, as an indication of the extent that the rates from these various causes are increased during months when influenza is epidemic.

TABLE 7.—Per cent that the recorded mortality from certain causes is increased during months when influenza is epidemic—35 large cities¹ in the United States

Cause of death (with International List numbers, 1920 revision)	Per cent that excess ² rate from each cause is of expected or normal rate for same cause (expected rate=100)		Expected or normal rate from each cause per 100,000 population (actual basis)	
	Epidemics of winter 1918-19 and 1920 ³	Epidemics of 1922, 1923, 1926, spring 1928, and winter 1928-29 ⁴	Epidemics of winter 1918-19 and 1920 ³	Epidemics of 1922, 1923, 1926, spring 1928, and winter 1928-29 ⁴
All causes.....	72.2	11.3	927.0	1,987.6
Influenza and pneumonia (11, 100, 101).....	442.8	44.7	128.8	270.0
All except influenza and pneumonia.....	12.4	6.1	798.2	1,717.6
Organic heart diseases (90).....	14.7	15.1	124.3	391.2
Nephritis (128, 129).....	15.4	10.1	73.2	165.7
Cerebral hemorrhage and softening (74, 83).....	7.7	8.5	50.5	113.2
Diabetes mellitus (57).....	(⁵)	18.8	(⁵)	34.6
Respiratory tuberculosis (31).....	23.5	5.6	80.5	127.5
Bronchitis (99).....	49.7	35.8	10.7	12.5
Puerperal causes other than septicemia (143-145; 147-150).....	124.3	7.5	6.4	12.1

¹ For list of cities see footnote to Table 1.

² Excess over the corresponding month of the preceding year or the average of a preceding year and a following year.

³ See footnote to Table 6 for months included as epidemic.

⁴ No monthly data available prior to 1921.

During influenza epidemic months in the years 1922-1929 the bronchitis death rate was 36 per cent above normal, and in peak months the increase was no doubt much greater. Similarly, there were very large increases in the death rate from puerperal causes during epidemic months of the years 1918-1920, which would have to be taken into account in any study of the chronology of deaths from these causes. The same thing is true of other more frequent causes of death listed in the table. Periods that include influenza epidemics are likely to show increased death rates from many diseases.

SUMMARY

Death rates from all causes, from influenza and pneumonia, and from all other causes were analyzed in weekly intervals for the years 1918 to 1929 for a group of 35 large cities in the United States with respect to (a) time distribution of the excess deaths during influenza epidemics in each of the three cause groups, (b) extent of the excess above expected or normal rates for the same season of the year, (c) proportion of the total excess that was credited to influenza and pneumonia, and (d) the proportion credited to other causes of death.

Weekly excess deaths credited to causes other than influenza and pneumonia present a picture strikingly similar in time distribution to excess deaths credited to influenza and pneumonia.

In the minor epidemics that have occurred since 1920, about 40 per cent of the excess mortality from all causes has been credited to causes other than influenza and pneumonia. In the epidemic of 1920, 23 per cent of the excess deaths were so credited, and in 1918-19, 8 per cent of the excess deaths were credited to causes other than influenza and pneumonia.

Excess deaths in which influenza or pneumonia was credited as a contributory but not as a primary cause of death seem to account for only about half of the excess deaths credited to causes other than influenza and pneumonia.

The chief causes to which excess deaths from causes other than influenza and pneumonia are credited during influenza epidemics are organic heart diseases, nephritis, cerebral hemorrhage, diabetes, respiratory tuberculosis, bronchitis, and puerperal conditions other than septicemia. In the epidemics of 1918-19 and 1920 respiratory tuberculosis and puerperal causes were more important as contributors of excess deaths than in the minor epidemics since 1920. In the latter epidemics from 1922 to 1929, 46 per cent of the excess deaths not credited to influenza and pneumonia were credited to organic heart diseases.

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- (1) Collins, S. D., Frost, W. H., Gover, M., and Sydenstricker, E.: Mortality from Influenza and Pneumonia in 50 Large Cities of the United States, 1910-1929. Pub. Health Rep., vol. 45, No. 39, September 26, 1930. (Reprint 1415.)

(2) Collins, S. D.: Age and Sex Incidence of Influenza and Pneumonia Morbidity and Mortality in the Epidemic of 1928-29 with Comparative Data for the Epidemic of 1918-19. Pub. Health Rep., vol. 46, No. 33, August 14, 1931. (Reprint 1500.)

(3) Britten, R. H., and Sydenstricker, E.: Mortality from Pulmonary Tuberculosis in Recent Years. Pub. Health Rep., vol. 37, No. 46, November 17, 1922. (Reprint 799.)

PRECEDING PAPERS ON THE EPIDEMIOLOGY OF INFLUENZA

Preceding papers from the office of statistical investigations dealing with various phases of the epidemiology of influenza are listed below:

The Incidence of Epidemic Influenza, 1918-19. A Further Analysis According to Age, Sex, and Color of the Records of Morbidity and Mortality Obtained in Surveys of 12 Localities. By Rollo H. Britten. Pub. Health Rep., vol. 47, No. 6, Feb. 5, 1932, pp. 303-339.

Age and Sex Incidence of Influenza and Pneumonia Morbidity and Mortality in the Epidemic of 1928-29 with Comparative Data for the Epidemic of 1918-19. By Selwyn D. Collins. Pub. Health Rep., vol. 46, No. 33, August 14, 1931. (Reprint 1500.)

The Incidence of Influenza Among Persons of Different Economic Status During the Epidemic of 1918. By Edgar Sydenstricker. Pub. Health Rep., vol. 46, No. 4, January 23, 1931. (Reprint 1444.)

Mortality from Influenza and Pneumonia in 50 Large Cities of the United States, 1910-1929. By S. D. Collins, W. H. Frost, Mary Gover, and Edgar Sydenstricker. Pub. Health Rep., vol. 45, No. 39, September 26, 1930. (Reprint 1415.)

Influenza-Pneumonia Mortality in a Group of about 95 Cities in the United States, 1920-1929. By S. D. Collins. Pub. Health Rep., vol. 45, No. 8, February 21, 1930. (Reprint 1355.)

The Influenza Epidemic of 1926. Pub. Health Rep., vol. 41, No. 34, August 20, 1926. (Reprint 1104.)

Variations in Case Fatality During the Influenza Epidemic of 1918. By Edgar Sydenstricker. Pub. Health Rep., vol. 36, No. 36, September 9, 1920. (Reprint 692.)

Statistics of Influenza Morbidity. By W. H. Frost. Pub. Health Rep., vol. 35, No. 11, March 12, 1920. (Reprint 586.)

Difficulties in Computing Civil Death Rates for 1918. By Edgar Sydenstricker and Mary L. King. Pub. Health Rep., vol. 35, No. 7, February 13, 1920. (Reprint 583.)

The Epidemiology of Influenza. By W. H. Frost. Pub. Health Rep., vol. 34, No. 33, August 15, 1919. (Reprint 550.)

Epidemic Influenza in Foreign Countries. By W. H. Frost and Edgar Sydenstricker. Pub. Health Rep., vol. 34, No. 25, June 20, 1919. (Reprint 537.)

Influenza in Maryland. By W. H. Frost and Edgar Sydenstricker. Pub. Health Rep., vol. 34, No. 11, March 14, 1919. (Reprint 510.)

A Comparison of the Mortality Rates by Weeks During the Influenza Epidemic of 1889-90 and During the Primary Stage of the Influenza Epidemic of 1918 in 12 Cities in the United States. Pub. Health Rep., vol. 34, No. 5, January 31, 1919. (Reprint 502.)

Preliminary Statistics of the Influenza Epidemic. By Edgar Sydenstricker. Pub. Health Rep., vol. 33, No. 52, December 27, 1918.

DEATHS DURING WEEK ENDED OCTOBER 22, 1932

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Oct. 22, 1932	Correspond- ing week, 1931
Data from 85 large cities of the United States:		
Total deaths.....	7,355	7,489
Deaths per 1,000 population, annual basis.....	10.5	10.8
Deaths under 1 year of age.....	559	709
Deaths under 1 year of age per 1,000 estimated live births ¹	47	54
Deaths per 1,000 population, annual basis, first 42 weeks of year.....	11.1	11.9
Data from industrial insurance companies:		
Policies in force.....	70,173,439	74,520,708
Number of death claims.....	12,741	12,648
Death claims per 1,000 policies, in force, annual rate.....	9.5	8.8
Death claims per 1,000 policies, first 42 weeks of year, annual rate.....	9.6	9.7

¹ 1932, 81 cities; 1931, 77 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended October 29, 1932, and October 31, 1931

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended October 29, 1932, and October 31, 1931

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931
New England States:								
Maine.....	1	2		2		96	0	0
New Hampshire.....		6				1	0	0
Vermont.....		1			1		0	0
Massachusetts.....	34	52	2	8	40	59	0	2
Rhode Island.....	7	7			1	60	0	0
Connecticut.....	5	5	2	3	10	9	2	1
Middle Atlantic States:								
New York.....	25	72	1 14	1 20	96	87	6	7
New Jersey.....	26	27	12	8	93	19	2	1
Pennsylvania.....	118	111			193	126	2	5
East North Central States:								
Ohio.....	122	142	94	19	101	25	1	3
Indiana.....	101	109	55		10	20	5	2
Illinois.....	112	110	17	8	30	26	7	4
Michigan.....	26	67	5		104	42	3	3
Wisconsin.....	13	22	26	11	123	17	1	2
West North Central States:								
Minnesota.....	21	21	3	1	102	6	1	1
Iowa.....	25	27		2	3	3	2	3
Missouri.....	92	92	2	3	8	5	1	1
North Dakota.....	1	6			67		0	0
South Dakota.....	1	4				13	0	1
Nebraska.....	40	22			5	1	0	0
Kansas.....	26	54	3		8	18	1	1
South Atlantic States:								
Delaware.....	4	3			1		0	0
Maryland.....	22	77	2	15	3	11	2	2
District of Columbia.....	2	11	1			2	0	0
Virginia.....	61				58		0	0
West Virginia.....	69	91	7	18	10	57	1	0
North Carolina.....	106	214	7	4	60	96	1	3
South Carolina.....	34	60	393	322	1	13	0	0
Georgia.....	56	51		21	1	3	0	1
Florida.....	18	28	4		1	27	0	0
East South Central States:								
Kentucky.....	82	170	36		44		1	2
Tennessee.....	95	166	25	27	1	6	1	0
Alabama.....	94	121	28	12	2	6	1	1
Mississippi.....	51	106					0	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended October 29, 1932, and October 31, 1931—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931
West South Central States:								
Arkansas.....	23	62	37	2	4	2	0	0
Louisiana.....	29	43	17	8	4	6	2	0
Oklahoma.....	86	161	25	14	1		0	0
Texas.....	185	35	46	10		14	0	0
Mountain States:								
Montana.....		1	14		85	18	1	0
Idaho.....	8	1			1	1	0	0
Wyoming.....		2	1		1		0	0
Colorado.....	6	1			1	1	0	0
New Mexico.....	10	22	27				0	0
Arizona.....	4	8	40	4	1		0	0
Utah.....				2	2	3	1	0
Pacific States:								
Washington.....		3			5	30	0	0
Oregon.....		4	36	22	23	11	0	0
California.....	59	105	214	44	40	108	4	6
Total.....	1,900	2,503	1,195	610	1,345	1,048	49	53
Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931
New England States:								
Maine.....	3	7	27	15	0	0	2	5
New Hampshire.....	0	0	26	5	0	0	0	1
Vermont.....	0	6	11	6	0	14	0	0
Massachusetts.....	1	39	181	199	0	0	14	5
Rhode Island.....	0	3	20	14	0	0	0	0
Connecticut.....	2	12	26	38	0	0	0	2
Middle Atlantic States:								
New York.....	7	92	238	242	1	24	22	26
New Jersey.....	8	26	119	90	0	0	7	2
Pennsylvania.....	32	27	402	282	0	0	55	76
East North Central States:								
Ohio.....	1	10	436	445	19	3	26	66
Indiana.....	1	1	117	88	1	5	6	10
Illinois.....	6	37	284	214	4	18	19	27
Michigan.....	1	28	218	141	0	19	6	17
Wisconsin.....	3	21	59	52	1	4	1	4
West North Central States:								
Minnesota.....	3	30	51	35	0	4	9	2
Iowa.....	0	11	47	22	2	13	2	5
Missouri.....	1	3	87	86	0	3	20	19
North Dakota.....	0	1	2	13	0	0	0	1
South Dakota.....	0	1	30	9	0	5	2	1
Nebraska.....	4	1	61	11	3	4	1	1
Kansas.....	1	0	93	51	1	3	7	13
South Atlantic States:								
Delaware.....	1	0	7	14	0	0	1	4
Maryland.....	0	1	79	90	0	0	30	50
District of Columbia.....	1	1	17	11	0	0	1	3
Virginia.....	3		96		0		20	
West Virginia.....	0	4	77	84	0	0	25	81
North Carolina.....	1	4	111	170	0	0	17	20
South Carolina.....	0	1	9	21	1	7	22	9
Georgia.....	1	0	45	24	0	0	21	19
Florida.....	0	1	7	7	0	0	0	4
East South Central States:								
Kentucky.....	3	2	88	103	1	4	43	42
Tennessee.....	4	2	90	85	0	5	24	38
Alabama.....	1	1	56	64	0	0	5	33
Mississippi.....	0	0	45	41	0	4	4	18

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended October 29, 1932, and October 31, 1931—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931	Week ended Oct. 29, 1932	Week ended Oct. 31, 1931
West South Central States:								
Arkansas.....	3	1	17	53	0	1	9	18
Louisiana ¹	0	0	18	24	1	1	6	36
Oklahoma ²	2	0	50	52	0	0	28	45
Texas ³	2	0	50	44	1	0	23	10
Mountain States:								
Montana.....	0	0	16	7	0	0	2	6
Idaho.....	1	0	3	5	2	0	3	1
Wyoming.....	0	0	18	3	0	0	0	0
Colorado.....	1	1	33	25	1	0	3	9
New Mexico.....	0	0	14	13	0	0	17	7
Arizona.....	0	1	15	7	0	1	4	5
Utah ⁴	0	0	0	5	0	0	1	0
Pacific States:								
Washington.....	1	3	27	35	5	3	5	5
Oregon.....	1	0	12	29	2	11	3	6
California.....	4	2	115	134	5	8	7	18
Total.....	104	381	3,680	3,208	51	164	523	770

¹ New York City only.

² Week ended Friday.

³ Typhus fever, week ended Oct. 29, 1932, 25 cases: 3 cases in Virginia, 1 case in North Carolina, 2 cases in South Carolina, 5 cases in Georgia, 1 case in Florida, 6 cases in Alabama, 2 cases in Louisiana, and 5 cases in Texas.

⁴ Figures for 1932 are exclusive of Oklahoma City and Tulsa, and for 1931 are exclusive of Tulsa only.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Menin- gococ- cus menin- gitis	Diph- theria	Infl- uenza	Malaria	Measles	Pellag- ra	Polio- myelitis	Scarlet fever	Small- pox	Ty- phoid fever
<i>August, 1932</i>										
Missouri.....	4	50	5	20	17		6	66		145
New Hampshire.....								13	0	3
<i>September, 1932</i>										
California.....	8	194	639	3	98	3	18	277	25	45
Colorado.....	5	18		3	13		0	147	16	46
Idaho.....	3	29			16		1	13		19
Missouri.....	8	174		21	9		2	150	0	108
Montana.....	1	5	11		131		1	39	2	24
New Hampshire.....		1					2	20	0	
Oregon.....		6	54	7	66		2	29	5	14
South Carolina.....		216	615	1,334	22	209	7	20	0	128
South Dakota.....		6			5		1	19	0	4
Texas.....	2	273	111	946		4	5	88		169
Virginia.....	3	140		37	37	16	9	161	0	138
Washington.....	2	17	28		29		12	78	4	28

<i>August, 1932</i>		<i>September, 1932</i>		Chicken pox—Con.	Cases
Missouri:	Cases	Anthrax:	Cases	Oregon.....	81
Chicken pox.....	12	California.....	1	South Carolina.....	5
Dysentery.....	1	South Dakota.....	2	South Dakota.....	18
Mumps.....	68	Chicken pox:		Virginia.....	17
Rabies in animals.....	2	California.....	302	Washington.....	81
Septic sore throat.....	2	Colorado.....	14	Diarrhea:	
Tularaemia.....	1	Idaho.....	16	South Carolina.....	407
Undulant fever.....	31	Missouri.....	7	Diarrhea and dysentery:	
Whooping cough.....	122	Montana.....	32	Virginia.....	287

Dysentery:	Cases	Paratyphoid fever:	Cases	Trichinosis:	Cases
California (amebic).....	8	California.....	3	Oregon.....	17
California (bacillary)....	44	Colorado.....	3	Tularaemia:	
Missouri.....	4	Oregon.....	2	Idaho.....	1
Oregon.....	1	South Carolina.....	13	Montana.....	3
Food poisoning:		Texas.....	1	Oregon.....	2
California.....	38	Virginia.....	12	South Carolina.....	1
German measles:		Psittacosis:		Virginia.....	2
California.....	37	California.....	1	Typhus fever:	
Montana.....	7	Puerperal septicemia:		South Carolina.....	4
Washington.....	11	Washington.....	1	Virginia.....	2
Granuloma, coccidioidal:		Rabies in animals:		Undulant fever:	
California.....	1	California.....	20	California.....	9
Hookworm disease:		Missouri.....	7	Colorado.....	1
California.....	1	South Carolina.....	11	Missouri.....	30
South Carolina.....	83	Washington.....	23	Oregon.....	5
Impetigo contagiosa:		Relapsing fever:		Virginia.....	2
Colorado.....	20	California.....	9	Washington.....	3
Montana.....	23	Rocky Mountain spotted fever:		Vincent's angina:	
Oregon.....	73	Montana.....	1	Colorado.....	2
Jaundice, epidemic:		Oregon.....	1	Montana.....	1
Oregon.....	1	Scabies:		Oregon.....	19
Leprosy:		Oregon.....	62	Vincent's infection:	
Washington.....	1	Septic sore throat:		Washington.....	3
Lethargic encephalitis:		California.....	3	Whooping cough:	
California.....	6	Colorado.....	6	California.....	986
South Carolina.....	2	Idaho.....	1	Colorado.....	70
Texas.....	1	Idaho.....	1	Idaho.....	6
Washington.....	4	Montana.....	4	Missouri.....	69
Mumps:		Oregon.....	7	Montana.....	123
California.....	273	Virginia.....	26	Oregon.....	24
Colorado.....	18	Silicosis:		South Carolina.....	39
Idaho.....	46	Montana.....	2	South Dakota.....	21
Missouri.....	33	Tetanus:		Virginia.....	213
Montana.....	2	California.....	5	Washington.....	39
Oregon.....	17	South Dakota.....	1		
South Carolina.....	25	Washington.....	1		
South Dakota.....	2	Trachoma:			
Washington.....	13	California.....	39		
Ophthalmia neonatorum:		Oregon.....	3		
California.....	2	South Dakota.....	5		
South Carolina.....	9	Virginia.....	1		
Virginia.....	5				

WEEKLY REPORTS FROM CITIES

City reports for week ended October 22, 1932

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland.....	0		1	0	3	0	0	0	0	6	19
New Hampshire:											
Concord.....	0	0	0	0	0	0	0	0	0	0	7
Nashua.....	0	0	0	0	0	0	0	0	0	0	0
Vermont:											
Barre.....	0	0	0	0	0	0	0	0	0	0	0
Massachusetts:											
Boston.....	2	1	11	14	38	0	16	0	32	200	
Fall River.....	1	0	1	3	5	0	0	2	2	35	
Springfield.....	1	0	0	1	1	0	3	0	14	29	
Worcester.....	0	0	0	3	13	0	2	1	0	49	
Rhode Island:											
Pawtucket.....	0	0	0	0	0	0	0	0	0	0	0
Providence.....	3	0	0	3	15	0	1	1	11	69	
Connecticut:											
Bridgeport.....	0	1	0	3	4	7	0	0	5	25	
Hartford.....	0	0	1	3	0	0	0	0	3	42	
New Haven.....	0	0	0	3	1	0	2	0	14	51	
New York:											
Buffalo.....	5	2	0	4	18	23	0	1	0	35	121
New York.....	39	15	4	33	114	54	0	73	8	79	1,347
Rochester.....	6	0	1	4	10	0	2	1	2	71	
Syracuse.....	0	0	0	4	8	0	0	0	2	38	
New Jersey:											
Camden.....	5	1	1	0	4	3	0	0	0	28	
Newark.....	1	8	0	4	4	8	0	5	1	15	95
Trenton.....	1	0	1	3	11	0	2	1	3	46	
Pennsylvania:											
Philadelphia.....	6	6	3	2	17	47	0	20	5	21	383
Pittsburgh.....	6	1	1	4	11	33	0	3	1	12	150
Reading.....	1	0	0	7	2	2	0	1	0	7	26

City reports for week ended October 22, 1932—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Ohio:											
Cincinnati.....	6		1	2	5	19	0	6	1	0	107
Cleveland.....	2	33	0	2	12	44	0	10	0	12	138
Columbus.....	2		0	23	2	12	0	4	0	0	85
Toledo.....	2		0	1	6	22	0	5	2	6	54
Indians:											
Fort Wayne.....	23		0	0	0	1	0	0	1	1	18
Indianapolis.....	4		1	0	7	11	0	5	1	2	
South Bend.....	1		0	0	0	6	0	0	0	0	14
Terre Haute.....	0		0	2	1	1	0	0	0	0	9
Illinois:											
Chicago.....	20	5	2	22	36	132	0	35	4	26	500
Springfield.....	9		0	0	1	4	0	0	0	0	21
Michigan:											
Detroit.....	18	2	0	10	10	48	0	23	2	66	237
Flint.....	2	11	0	0	4	0	0	1	0	5	28
Grand Rapids.....	0		0	0	0	3	0	0	0	13	29
Wisconsin:											
Kenosha.....	0		0	0	1	2	1	1	0	0	9
Madison.....	1			2		1	0	1	1	3	
Milwaukee.....	3	3	3	2	3	9	0	5	0	27	101
Racine.....	0	0	0	0	0	3	0	1	0	1	10
Superior.....	0		0	0	0	1	0	1	0	0	6
Minnesota:											
Duluth.....	0		0	1	1	3	0	1	1	0	15
Minneapolis.....	1		0	6	9	17	0	3	0	6	98
St. Paul.....	0		0	0	4	10	0	0	0	27	48
Iowa:											
Des Moines.....	11			0		5	0		0	0	44
Sioux City.....	3		0	0		2	1		1	0	
Waterloo.....	0		0	0	0	1	0	0	0	5	
Missouri:											
Kansas City.....	4		0	4	14	9	0	3	0	5	92
St. Joseph.....	11		1	0	2	5	0	0	1	0	19
St. Louis.....	16	2		2	2	19	0	8	5	0	199
North Dakota:											
Fargo.....	0		0	1	2	0	0	0	0	0	10
Grand Forks.....	0		0	3	0	1	0	0	0	0	0
South Dakota:											
Aberdeen.....	0		0	0	0	0	0	0	0	0	0
Nebraska:											
Omaha.....	18		0	0	5	12	0	1	0	2	53
Kansas:											
Topeka.....	4		0	1	0	2	0	0	0	0	3
Wichita.....	5		0	0	4	11	0	1	0	0	34
Delaware:											
Wilmington.....	0		0	2	2	5	0	0	0	2	34
Maryland:											
Baltimore.....	1	2	0	0	19	25	0	10	3	15	194
Cumberland.....	0		0	0	1	1	0	1	1	0	13
Frederick.....	0		0	0	0	1	0	0	0	0	2
District of Columbia:											
Washington.....	1	1	0	3	8	16	0	8	0	7	137
Virginia:											
Lynchburg.....	1		0	0	0	2	0	0	0	4	7
Norfolk.....	0		0	15	1	2	0	0	0	1	20
Richmond.....	3		0	1	5	5	0	3	0	4	54
Roanoke.....	0		0	0	0	6	0	0	0	1	11
West Virginia:											
Charleston.....	0		0	0	1	0	0	0	0	0	19
Huntington.....	7		0	0	0	7	0	0	0	0	
Wheeling.....	0		0	3	3	2	0	0	0	9	8
North Carolina:											
Raleigh.....	1		0	1	1	5	0	1	0	0	11
Wilmington.....	2		0	2	1	1	0	0	0	0	15
Winston-Salem.....	1		0	1	0	0	0	4	0	0	23
South Carolina:											
Charleston.....	0	6	0	0	0	1	0	1	2	0	21
Columbia.....	3		0	0	3	2	0	5	2	0	37
Greenville.....	0		0	0	0	0	0	0	0	0	0
Georgia:											
Atlanta.....	9	5	0	0	7	5	0	4	2	1	70
Brunswick.....	0		0	0	0	0	0	0	0	0	4
Savannah.....	2		0	0	2	2	0	2	0	0	26
Florida:											
Miami.....	0	1	0	1	2	0	0	2	0	1	14
Tampa.....	4		0	0	0	1	0	0	0	0	27

City reports for week ended October 22, 1932—Continued

State and city	Diph- theria cases	Influenza		Meas- sles cases	Pneu- monia deaths	Scarlet fever cases	Small- pox cases	Tuber- culosis deaths	Ty- phoid fever cases	Whoop- ing cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Lexington.....	0		0	0	3	7	0	2	0	0	14
Louisville.....	8	1	0	0	11	6	0	3	4	2	111
Tennessee:											
Memphis.....	9		0	1	6	8	0	9	1	0	99
Nashville.....	4		0	0	0	7	0	3	2	0	37
Alabama:											
Birmingham...	13	3	0	1	0	8	0	3	2	0	59
Mobile.....	4		0	0	2	0	0	1	0	0	25
Montgomery...	2		0	0	0	3	0		0	0	
Arkansas:											
Fort Smith.....	2		0	0	0	1	0	0	0	0	
Little Rock.....	3		0	0	0	4	0	3	0	0	3
Louisiana:											
New Orleans...	12	3	1	0	15	7	0	8	0	1	124
Shreveport.....	0		0	0	1	1	0	1	0	0	31
Oklahoma:											
Oklahoma City..	12	16	0	2	2	11	0	1	0	0	28
Tulsa.....	6		0	0	0	4	0	0	0	0	2
Texas:											
Dallas.....	37		0	0	7	13	0	1	0	0	48
Fort Worth.....	9		1	0	5	10	0	0	2	0	28
Galveston.....	0		0	0	2	0	0	0	0	0	7
Houston.....	12		0	0	3	2	0	8	0	0	64
San Antonio.....	8		0	0	10	3	0	8	0	0	62
Montana:											
Billings.....	0		0	0	0	0	0	0	0	0	3
Great Falls.....	0		0	3	1	3	0	1	0	0	13
Helena.....	0		0	0	0	0	0	0	0	0	4
Missoula.....	0		0	0	0	0	0	0	0	0	7
Idaho:											
Boise.....	0		0	3	0	0	7	0	1	0	5
Colorado:											
Denver.....	7		0	2	14	15	0	1	0	10	81
Pueblo.....	0		0	0	2	0	0	0	0	4	12
New Mexico:											
Albuquerque...	2	3	0	0	0	0	0	3	0	0	10
Arizona:											
Phoenix.....	0		0	0	2	0	0	3	0	0	
Utah:											
Salt Lake City..	1		0	2	2	0	0	2	0	1	28
Nevada:											
Reno.....	0		0	0	0	0	0	0	0	0	3
Washington:											
Seattle.....	0			0		2	1		1	0	
Spokane.....	0			1		1	0		0	0	
Tacoma.....	0		0	0	0	2	2	0	0	0	19
Oregon:											
Portland.....	0	2	0	1	2	5	0	0	0	0	56
Salem.....	0	2	0	1	0	0	0	0	0	0	0
California:											
Los Angeles.....	19	82	1	8	14	31	0	17	4	17	270
Sacramento.....	1	1	0	0	3	0	0	2	0	2	22
San Francisco...	3	4	1	2	7	6	0	13	1	13	153

City reports for week ended October 22, 1932—Continued

State and city	Meningococcus meningitis		Polio- mye- litis cases	State and city	Meningococcus meningitis		Polio- mye- litis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Maryland:			
Boston.....	0	0	1	Baltimore.....	0	1	1
New York:				District of Columbia:			
Buffalo.....	1	0	0	Washington.....	0	0	4
New York.....	3	0	2	Florida:			
New Jersey:				Tampa.....	0	0	1
Camden.....	0	0	2	Kentucky:			
Pennsylvania:				Louisville.....	0	1	0
Philadelphia.....	1	0	16	Tennessee:			
Reading.....	0	0	1	Nashville.....	0	0	2
Ohio:				Texas:			
Cleveland.....	0	0	1	Fort Worth.....	0	0	1
Columbus.....	1	1	0	Montana:			
Indiana:				Missoula.....	1	1	0
Indianapolis.....	0	1	0	Oregon:			
Illinois:				Portland.....	0	0	1
Chicago.....	4	1	2	California:			
Michigan:				Los Angeles.....	0	0	1
Detroit.....	2	0	0	San Francisco.....	0	0	2
Iowa:							
Des Moines.....	0	0	1				

Lethargic encephalitis.—Cases: New York, 1; Philadelphia, 1; Detroit, 3; San Francisco, 1.

Pellagra.—Cases: Raleigh, 1; Winston-Salem, 1; New Orleans, 2.

Typhus fever.—Cases: Savannah, 1; Montgomery, 2; Houston, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended October 15, 1932.—
The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended October 15, 1932, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis.....				1					1
Chicken pox.....	5	3	38	118	37	5	18	21	245
Diphtheria.....	1	4	20	15	7	7			64
Erysipelas.....			4	2	2			1	11
Influenza.....	6							9	15
Lethargic encephalitis.....			1						1
Measles.....	1		9	98	10		35	26	179
Mumps.....				34	1	1	1	18	55
Paratyphoid fever.....				3					3
Pneumonia.....	1							5	6
Poliomyelitis.....	1		38	17		1	1		58
Scarlet fever.....	9	8	61	38	14		2	15	152
Trachoma.....					9	2		3	14
Tuberculosis.....	3	12	62	39	6	35		12	169
Typhoid fever.....	4	1	44	27	4	9		1	90
Undulant fever.....				1					1
Whooping cough.....	7		44	68	22	2	7	4	154

ITALY

*Communicable diseases—Four weeks ended June 26, 1932.—*During the four weeks ended June 26, 1932, cases of certain communicable diseases were reported in Italy as follows:

Disease	May 30-June 5		June 6-12		June 13-19		June 20-26	
	Cases	Com-munes affected	Cases	Com-munes affected	Cases	Com-munes affected	Cases	Com-munes affected
Anthrax.....	12	12	21	19	23	18	15	15
Cerebrospinal meningitis.....	18	16	12	11	8	7	11	9
Chicken pox.....	274	133	202	103	198	90	227	99
Diphtheria and croup.....	307	166	277	148	282	168	317	188
Dysentery.....	2	2	5	4	10	3	5	4
Lethargic encephalitis.....	3	3	2	2	2	2	1	1
Measles.....	1,862	311	1,597	275	1,680	296	1,637	330
Poliomyelitis.....	12	12	9	8	15	15	20	18
Scarlet fever.....	338	121	318	123	327	115	345	129
Typhoid fever.....	226	140	240	138	209	141	384	197

PUERTO RICO

Communicable diseases—Four weeks ended October 8, 1932.—During the four weeks ended October 8, 1932, cases of certain communicable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Bronchitis.....	14	Ophthalmia neonatorum.....	3
Chicken pox.....	29	Paratyphoid fever.....	2
Diphtheria.....	34	Pneumonia.....	11
Dysentery.....	35	Syphilis.....	162
Erysipelas.....	5	Tetanus.....	2
Filariasis.....	7	Tetanus, infantile.....	3
Framboesia, tropical.....	9	Trachoma.....	5
Influenza.....	6, 269	Tuberculosis.....	358
Malaria.....	2, 812	Typhoid fever.....	11
Measles.....	103	Whooping cough.....	115
Mumps.....	10		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of the quarantinable diseases appeared in the Public Health Reports for October 23, 1932, pp. 2123-2136. A similar cumulative table will appear in the Public Health Reports to be issued November 25, 1932, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Cholera

Philippine Islands.—During the week ended October 29, 1932, 8 cases of cholera with 5 deaths were reported in Samar Province, P. I.

Plague

On vessel.—A case of plague was reported September 7, 1932, on the S. S. *Taisan Maru*, en route from Tsingtao to Moji.

Yellow Fever

Senegal.—During the week ended October 22, 1932, 8 cases of yellow fever with 5 deaths were reported in Senegal.